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LEARNING RESEARCH AND DEVELOPMENT CENTER

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Dr. Susan Chipman
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Office of Naval Research
800 N. Quincy St.
Arlington, VA 22217-5000

Dear Susan;

This letter is a quarterly progress report for the University of Pittsburgh part of the Analysis of Symbolic Models of Cognition project (ASPM-Pitt), grant number N00014-91-J-1529. It covers the period April, 1992 to June, 1992.

The daily work during this quarter consisted of adding new subtraction bugs to Deb, running Deb to produce primitive response partitions, and running ASPM on these primitive response partitions. (A primitive response partition records all possible parameterizations of Deb and the answers produced by each parameterization to a *single* subtraction problem. ASPM's basic job is the combine these primitive response partitions into compound response partitions and/or search the response partitions to find a best fitting parameterization for *all* the subtraction problems.)

One of the goals of ASPM-Pitt is to devise a modelling language that will automate efficient generation of primitive response partitions. In order to set the stage for developing such a language, we need a model that is combinatorially complex. The complexity must be great enough that changes in the algorithm will cause significant changes in speed even when they also increase the overhead. Because there are around 120 subtracton bugs, Deb should be sufficiently complex. However, we must implement most of these subtraction bugs in order to have sufficient complexity.

At the end of the quarter, 63 subtraction bugs had been implemented and tested in isolation. That is, when a bug was installed and run on all the subtraction problems, it produced the same answers as the Debuggy version of the bug. However, one of the unfortunate discoveries during this quarter is that some of the bugs do not behave properly when combined with other bugs. It is difficult to find these interactions because there are so many different combinations of bugs. Fortunately, we also discovered that ASPM could be used to detect some of the interactions. The

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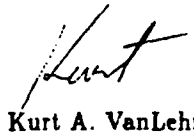
CMU team implemented new ASPM commands that check a primitive response partition to make sure that the same parameterization doesn't appear twice and that no parameterizations are missing. This facility has helped us detect many interactions among the subtraction bugs. We started over, using this facility, adding five subtraction bugs at a time to Deb and checking for interactions with ASPM. At the end of June, we were up to 25 bugs.

A large number of subtle ASPM bug were found during this quarter, mostly having to do with the fact that the shape of Deb's parameter space is quite different than the shape of Syl's parameter space. For instance, at the end of the quarter, we are still not able to do a complete run of Deb's output because we are exceeding some size limit set by the Ultrix operating system (which is slightly different from the Mach operating system used at CMU). It has been a frustrating quarter for everyone, but we are happy to be getting the bugs out of ASPM now rather than later. This moves us one step closer to having a robust tool that any cognitive scientist can use.

Sincerely,



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cc: ONR Resident Representative N66005, OSU Research Center
Director, Naval Research Laboratory, Code 2627
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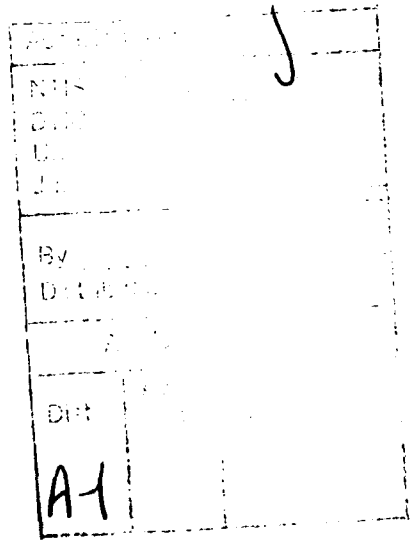
University of Pittsburgh Contracts Office



Dist A per telecon Ms. S. Chipman
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9/30/92 CG